

CLAIMS:

We claim:

1. A drug delivery device for animals, the device comprising:
 - a. at least one syringe;
 - b. at least one catheter placed into an animal and connected to each of the at least one syringes by at least one disposable tube; and
 - c. at least one valve that has a first position and a second position, wherein the second position receives one of the at least one disposable tubes therethrough.
2. The drug delivery device of claim 1, further comprising at least one syringe pump, wherein each of the at least one syringe pumps is associated with one of the at least one syringes, such that each of the at least one syringe pumps operates each of the at least one syringes independently of each other.
3. The drug delivery device of claim 2, further comprising at least one fluid reservoir that contains a fluid, wherein each of the at least one fluid reservoirs is connected to one of the at least syringes by at least one syringe inlet, the at least one syringe inlet being received by the first position of the at least one valve.
4. The drug delivery device of claim 3, wherein the at least one syringe comprises a first syringe, a second syringe and a third syringe.
5. The drug delivery device of claim 4, wherein the at least one syringe pump comprises a first syringe pump operably connected to the first syringe, a second syringe pump operably connected to the second syringe and a third syringe pump operably connected to the third syringe.

6. The drug delivery device of claim 5, wherein the at least one fluid reservoir comprises a first fluid reservoir connected to the first syringe by a first syringe inlet, a second fluid reservoir connected to the second syringe by a second syringe inlet and a third fluid reservoir connected to the third syringe by a third syringe inlet.

7. The drug delivery device of claim 6, wherein the at least one disposable tubes comprises a first syringe outlet connected to the first syringe, a second syringe outlet connected to the second syringe, a third syringe outlet connected to the third syringe, a connecting tube that connects the first and second syringe outlets to the third syringe outlet and a system outlet that connects the connecting tube and third syringe outlet to the at least one catheter.

8. The drug delivery device of claim 7, wherein the at least one catheter comprises a catheter connected to the system outlet by a catheter outlet.

9. The drug delivery device of claim 8, wherein the at least one valve comprises a first valve with its first position containing the first syringe inlet and its second position containing the first syringe outlet, a second valve with its first position containing the second syringe inlet and its second position containing the second syringe outlet, a third valve with its first position containing the third syringe inlet and its second position containing the third syringe outlet and a fourth valve with its first position containing the catheter outlet.

10. The drug delivery device of claim 9, further comprising a waste outlet that is connected to the system outlet and that is contained by the second position of the fourth valve, so that when the first position of the fourth valve is open, the second position of the fourth valve is closed and fluid is allowed to pass between the system outlet and the catheter outlet, and when the second position of the fourth valve is open, the first position of the fourth valve is closed and fluid is allowed to pass between the system outlet and the waste outlet.

11. The drug delivery device of claim 10, further comprising a controller that is operably connected to the first, second, and third syringe pumps and that is operably connected to the first, second, third, and fourth valves, such that the controller automatically controls the movement of the first, second, and third syringe pumps and controls the movement of the first and second positions of each of the first, second, third, and fourth valves.

12. The drug delivery device of claim 5, wherein the at least one fluid reservoir comprises a first fluid reservoir connected to the first syringe by a first syringe inlet and a second fluid reservoir connected to the second syringe by a second syringe inlet.

13. The drug delivery device of claim 5, wherein the at least one fluid reservoir comprises a first fluid reservoir connected to the first syringe by a first syringe inlet.

14. The drug delivery device of claim 1, wherein one of the at least one syringes contains a drug.

15. The drug delivery device of claim 1, wherein one of the at least one syringes contains a saline solution.

16. The drug delivery device of claim 5, wherein one of the at least one reservoirs contains a drug.

17. The drug delivery device of claim 5, wherein one of the at least one reservoirs contains a saline solution.

18. A method for delivering a fluid to an animal, the method comprising the steps of:

- a. providing at least one catheter
- b. inserting the catheter into the animal, so that a fluid can be withdrawn from the animal;

- c. connecting the at least one catheter by at least one disposable tube to at least one drug delivery device having
 - 1. at least one syringe containing a fluid; and
 - 2. at least one valve that has a first position and a second position, wherein the second position receives one of the at least one disposable tubes therethrough; and
- d. injecting the fluid into the animal by opening the second position of the at least one valve and pushing the at least one syringe so that the fluid will flow through the at least one disposable tube, through the catheter and into the animal.

19. The method of claim 18, wherein the drug delivery device further comprises at least one syringe pump, wherein each of the at least one syringe pumps is associated with one of the at least one syringes, such that each of the at least one syringe pumps operates each of the at least one syringes independently of each other.

20. The method of claim 19, wherein the drug delivery device further comprises at least one fluid reservoir containing at least one fluid, wherein each of the at least one fluid reservoirs is connected to one of the at least one syringes by at least one syringe inlet, the at least one syringe inlet being received by the first position of the at least one valve.

21. The method of claim 20, further comprising the step of filling the at least one syringe with the fluid from the reservoir by opening the first position of the at least one valve and pulling the at least one syringe.

22. The method of claim 21, wherein the drug delivery device further comprises a controller that is operably connected to the at least one syringe pump and that is operably connected to the at least one valve, such that the controller automatically controls the movement

of the at least one syringe pump and controls the movement of the first and second positions of the at least one valve.

23. The method of claim 22, wherein the at least one reservoir comprises one reservoir filled with a first fluid.

24. The method of claim 23, wherein the at least one syringe comprises:

- a. a first syringe connected to the at least one reservoir by a syringe inlet,
- b. a second syringe that is filled with a second fluid and that is connected to the first syringe by a first syringe outlet and a second syringe outlet, and
- c. a third syringe that is filled with a third fluid and that is connected to the second syringe by the second syringe outlet and a connecting tube, and that is connected to the catheter with a third syringe outlet and a system outlet.

25. The method of claim 24, wherein the at least one syringe pump comprises a first syringe pump operably connected to the first syringe, a second syringe pump operably connected to the second syringe and a third syringe pump operably connected to the third syringe.

26. The method of claim 25, wherein the at least one valve comprises a first valve containing the syringe inlet in its first position and the first syringe outlet in its second position, a second valve containing the second syringe outlet in its second position, and a third valve that contains the third syringe outlet in its second position.

27. The method of claim 26, further comprising the steps of:

- a. opening the second position of the second valve and the second position of the third valve; and
- b. injecting the second and third fluids into the animal through the catheter by pushing the second syringe and the third syringe.

28. The method of claim 22, wherein the at least one reservoir comprises a first reservoir filled with a first fluid and a second reservoir filled with a second fluid.

29. The method of claim 28, wherein the at least one syringe comprises:

- a. a first syringe connected to the first reservoir by a first syringe inlet,
- b. a second syringe that is connected to the second reservoir by a second syringe inlet and connected to the first syringe by a first syringe outlet and a second syringe outlet, and
- c. a third syringe that is filled with a third fluid and that is connected to the second syringe by the second syringe outlet and a connecting tube, and that is connected to the catheter with a third syringe outlet and a system outlet.

30. The method of claim 29, wherein at least one valve comprises a first valve containing the syringe inlet in its first position and the first syringe outlet in its second position, a second valve containing the second syringe inlet in its first position and the second syringe outlet in its second position, and a third valve that contains the third syringe outlet in its second position.

31. The method of claim 30, further comprising the steps of:

- a. opening the first position of the second valve;
- b. pulling the second syringe, so that the second syringe fills with the second fluid;
- c. opening the second position of the second valve and the second position of the third valve; and
- d. injecting the second and third fluids into the animal through the catheter by pushing the second syringe and the third syringe.

32. The method of claim 22, wherein the at least one fluid reservoir comprises a first reservoir filled with a first fluid, a second reservoir filled with a second fluid, and a third reservoir filled with a third fluid.

33. The method of claim 32, wherein the at least one syringe comprises:

- a. a first syringe connected to the first reservoir by a first syringe inlet,
- b. a second syringe that is connected to the second reservoir by a second syringe inlet and to the first syringe by a first syringe outlet and a second syringe outlet, and
- c. a third syringe that is connected to the third reservoir by a third syringe inlet, to the second syringe by the second syringe outlet and a connecting tube, and that is connected to the catheter with a third syringe outlet and a system outlet.

34. The method of claim 33, wherein the at least one catheter comprises one catheter connected to the system outlet by a catheter outlet, such that the first, second or third fluid may pass from the system outlet through the catheter outlet and the catheter into the animal.

35. The method of claim 34, wherein the at least one valve comprises a first valve with its first position containing the first syringe inlet and its second position containing the first syringe outlet, a second valve with its first position containing the second syringe inlet and its second position containing the second syringe outlet, a third valve with its first position containing the third syringe inlet and its second position containing the third syringe outlet and a fourth valve with its first position containing the catheter outlet, such that each valve can control the passage of fluid through each of the syringe inlets, each of the syringe outlets and the catheter outlet.

36. The method of claim 35, wherein the drug delivery device further comprises a waste outlet that is connected to the system outlet, the waste outlet being contained by the second position of the fourth valve, so that when the first position of the fourth valve is open, the second position of the fourth valve is closed and fluid is allowed to pass between the system outlet and the catheter outlet, and when the second position of the fourth valve is open, the first position of the fourth valve is closed and fluid is allowed to pass between the system outlet and the waste outlet.

37. The method of claim 36, wherein the first fluid comprises a saline solution, the second fluid comprises a first drug, and the third fluid comprises a second drug, so that the first syringe can be filled with the saline solution in order to flush the catheter, so that the second syringe can be filled with a first drug in order to inject the drug into the animal, and so that the third syringe can be filled with the second drug in order to inject the drug into the animal.

38. The method of claim 37, further comprising the steps of:

- a. opening the first position of each of the first, second and fourth valves and opening the second position of the third valve;
- b. causing the first and third syringe pumps to pull the first and third syringes, respectively, so that a body fluid of the animal appears in the catheter outlet and the first catheter fills with saline;
- c. opening the second position of the first valve and opening the first position of the third valve; and
- d. causing the first syringe pump to push the first syringe, so that the saline flushes the catheter outlet and the catheter.

39. The method of claim 38, further comprising the steps of:
- a. opening the first position of the first valve;
 - b. causing the first syringe pump to pull the first syringe and causing the second syringe pump to pull the second syringe, so that the first syringe fills with saline and the second syringe fills with the first drug;
 - c. opening the second position of the second valve and causing the second syringe pump to push the second syringe, so that the first drug is injected into the animal through the catheter outlet and catheter; and
 - d. opening the second position of the first valve, opening the first position of the second valve, and causing the first syringe pump to push the first syringe, so that the catheter outlet and catheter are flushed with saline.
40. A method for collecting fluids from an animal, the method comprising the steps of:
- a. providing a waste outlet and a catheter;
 - b. inserting the catheter into the animal, so that a fluid can be withdrawn from the animal;
 - c. connecting the catheter to at least one drug delivery device having
 1. a first syringe and a second syringe, wherein the second syringe is connected to the first syringe by a first syringe outlet and a second syringe outlet and the second syringe is connected to the catheter and the waste outlet by the second syringe outlet, a source outlet and a catheter outlet;

2. at least one fluid reservoir with a fluid, wherein the at least one fluid reservoir is connected to at least one of the two syringes by at least one syringe inlet; and
 3. a first valve that has a first position that contains the at least one syringe inlet and a second position that contains the first syringe outlet, a second valve that has a first position that may contain at least one syringe inlet and a second position that contains the second syringe outlet, and a third valve that has a first position that contains the catheter outlet and a second position that contains the waste outlet;
 - d. withdrawing a fluid sample from the animal into the second syringe by opening the second position of the second valve, opening the first position of the third valve and pulling the second syringe, so that the fluid sample will pass through the catheter into the drug delivery device and into the second syringe; and
 - e. collecting the fluid sample by opening the second position of the third valve and pushing the second syringe, so that the fluid sample will pass out of the drug delivery device through the waste outlet.
41. A drug delivery device for animals, the device comprising:
- a. at least one syringe;
 - b. at least one fluid reservoir that contains a fluid, wherein each of the at least one fluid reservoirs is connected to one of the at least one syringes by at least one syringe inlet;
 - c. at least one catheter placed into an animal and connected to each of the at least one syringes by at least one disposable tube; and

- d. at least one valve that has a first position and a second position, wherein the first position receives the at least one syringe inlet therethrough and the second position receives one of the at least one disposable tubes therethrough.
42. A drug delivery device for animals, the device comprising:
- a. at least one syringe;
 - b. at least one fluid reservoir that contains a fluid, wherein each of the at least one fluid reservoirs is connected to one of the at least one syringes by at least one syringe inlet;
 - c. at least one catheter placed into an animal and connected to each of the at least one syringes by at least one disposable tube and a catheter outlet;
 - d. at least one waste outlet connected to each of the at least one syringes by the at least one disposable tubes; and
 - e. at least two valves, a first valve and second valve, wherein the first valve has a first position that receives the at least one syringe inlet therethrough and has a second position that receives one of the at least one disposable tubes therethrough, and wherein the second valve has a first position that receives the catheter outlet therethrough and has a second position that receives the waste outlet therethrough.